SEDAR 16 King Mackerel Review Panel Information Provided by Ben Hartig

Ben Hartig

SEDAR38-DW-14

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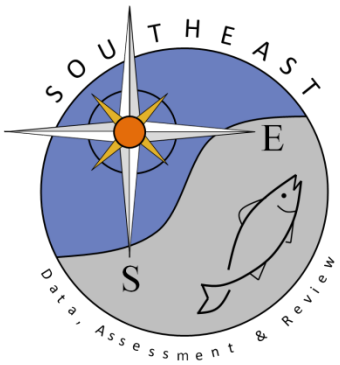

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PRESENTATION AT THE SEDAR 16 REVIEW WORKSHOP

I attended the SEDAR 16 King Mackerel Data and Review workshops as a panel member in the DW and an appointed observer at the RW.

I have been commercial fishing for Atlantic king mackerel for over 40 years. I have seen this stock at its best in the late 1960's through the mid 1980's and have witnessed the stock's worst condition in the late 1980's through the early 1990's. Since that time, I have watched a steady recovery to the stock's present status, which rivals abundance in the earlier time period.

I have been extensively involved in State and Federal fisheries management since the early 1980's. I have been past member and chair of the Snapper/Grouper AP, past member and chair of the South Atlantic Fisheries Management Council (SAFMC), current chair of the mackerel AP and I serve on two other council AP's. I am a member of the Oculina HAPC Evaluation Team. I have just finished working on a cooperative research proposal with Dr. Will Patterson and Kate Shepard, which examined stock mixing among winter sampling zones off South Florida with otolith shape and otolith stable isotope analysis.

During SEDAR 16, there were four base VPA model runs, which evolved through time as different model and data choices were made. The first run indicated Atlantic king mackerel in good shape with no overfishing occurring and the stock not overfished. This was in line with what I had observed through time. The corresponding Gulf run was not as optimistic, although this was not unexpected given the new 50/50 mixing zone addition to the model.

I received a call after the AW that the analysts had rerun the base model with a number of changes, which made the Gulf look much better but now the Atlantic was overfishing. I was told that the main driver for this result was the low level of recruitment that had been occurring. It just happened to be the time of year when we catch our smaller king mackerel, so I started measuring all kings on each trip on six trips. I also measured fish from two other fishermen's catches on August 1st. There were a total of 630 king mackerel measured from the 9th of July through August 1st, 2008 (Fig. 1). This figure represents the length frequency distribution for both males and females. Males averaged 75.9 cm fork length, while females averaged 80.8 cm. These are some of the smallest spawning king mackerel to make the April through September South Florida spawning migration.

In 2003, SEDAR 5 also indicated low levels of recruitment. If recruitment had actually been as low as predicted in these assessments, the higher catch levels that the commercial fishery has displayed in recent years would not have been possible.

Observed recruitment in the spawning stock, which migrates to South Florida, has actually been rather flat with a slight increasing trend. We have observed a steady increase across all size ranges in the spawning stock over time. However, we had not seen the large year (size) classes that had supported the fishery in the late 1960's through the mid 1980's. That all changed in 2006. In June of 2006, we fished on a large area of small king mackerel in the 4 to 6 pound range. Most were probably first time spawners. King mackerel in the same size range were caught from Jupiter to Cape Canaveral over about

a three week period. Another group of spawning kings showed up in July. These were in the 5 to 7 pound range and covered the same geographic area. These two size classes represent the largest increase in recruitment that we've observed since the late 1980's.

Not only has this surge in recruitment been observed in the spring and summer fishery, it has been increasingly evident in the mixing zone during winter off the east, central Florida coast. In the 2006/07 winter fishery, the quota was approximated for the first time in recent history. In 2007/08, the quota was caught near the end of February, leaving the entire month of March closed to king mackerel production in this area.

At the RW, I was also able to present my catch history for Atlantic Kings from 1980 through 2008 (Fig. 4 and 5). These landings were made over a rather small geographic area within a 20 mile radius of Jupiter Inlet, Florida. These landings represent catches during the months of April through September. The majority of king mackerel landings from Florida during this time come from this general area. A significant portion of the Atlantic stock migrates to South Florida to spawn during spring and summer.

My intention initially was to have my catch history available for the DW for possible inclusion in the model as a CPUE index but was unable to meet the deadline.

Previous assessments had indicated that part of the problem with assessing Atlantic Kings stems from the fact that total landings are relatively flat over time without much contrast. I knew that my landings contained significant contrast but even I was surprised at the magnitude of change over time in the graphic representation of the data (Fig. 4 and 5).

Total landings during the April through September timeframe and catch per trip are shown in Figure 4. In the early to mid 1980's, catch per trip was relatively higher due to the high abundance of king mackerel and the lack of regulatory restrictions. By 2003, the total catch had rebounded to the higher levels seen in the mid 1980's. However, it took more trips to land the same amount of catch. Implementation of restrictive trip limits (50 fish) was the main reason for the catch per trip differential in the more recent years. The take home message is that abundance or, in this case, spawning stock biomass has increased to produce the same levels of catch observed in the 1980's in spite of the implementation of restrictive trip limits.

The same landings pattern is represented in Figure 5 where total catch is compared to total trips. It takes more trips to produce comparable harvest levels in the more recent years.

The significant decline in landings beginning in 1987 was caused by the introduction of drift gillnets into the fishery in 1985. Total catch from this gear was about 86,000 pounds or 3.5% of total commercial harvest in 1985. Landings more than tripled the next year to about 278,000 pounds or 10% of commercial catch. By 1988, drift gillnets were responsible for about 779,000 pounds or 24.6% of the commercial take. Drift gillnet landings declined to 694,000 pounds in 1989, while the contribution to total commercial landings continued its increasing trend to 28%.

In a contentious and controversial decision, the SAFMC prohibited drift gillnets in 1990. This decision was based on testimony from recreational and hook-and-line commercial fishermen, regarding significant declines in king mackerel catch and abundance. These were also significant issues with by catch and cryptic mortality.

During deliberations at the NMFS level, we were told that the main issue driving the argument was the competition between the gear types. If this was true once the gear was removed from the water, our catches should have rebounded to some semblance of the early 1980's. As you can see in Figure 4 and 5, they did not! In fact, catches from the spawning stock continued to decline to their lowest level of catch in 1992.

You might question why the stock continued to decline after the gear was prohibited. Also, why did it take 10 years to discern significant spawning stock rebuilding? During drift gillnet deliberations, I reviewed a number of scientific papers concerning fallout rates and cryptic mortality in the salmon drift gillnet fishery off the Pacific Northwest. All of those papers reported significant cryptic mortality and several reported a 50% or more loss of resources. I compared the soak and haulback times of the salmon and king mackerel driftnet fisheries. It became obvious that losses of king mackerel were significantly higher due to the longer soak and haulback times. In my opinion, it was not unrealistic to approximate cryptic mortality at 75% or more of the landings. This possibility becomes an important point when considering the long term sustainable commercial production available for Atlantic group king mackerel.

I will have a short addendum to this presentation at the SSC meeting in December.

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Past Member and Chair Snapper/Grouper AP
Past Member and Chair SAFMC
Current Chair Mackerel AP
Current Member Marine Protected Area AP
Current Member Protected Resources AP
Current Member Oculina Evaluation Team
Panel and Observer SEDAR 5 King Mackerel
Panel and Observer SEDAR 16 King Mackerel
Panel and Observer SEDAR 17 Spanish Mackerel

After I made this presentation at the RW, a number of questions came to mind. The first is there another way to portray my catch history that would validate the increasing recruitment we have witnessed over the past several years. Figure 6 depicts my catch history divided into three bimonthly intervals. This breakdown, although somewhat artificial, does fit the peaks of abundance we see throughout the season. The June/July period indicates important changes in abundance in the most recent years. The measurements displayed in Figures 1-3 were made during this timeframe. We have seen from these figures that these size ranges are indicative of king mackerel in their first or second spawning year.

There are several reproductive papers available regarding size at first maturity in king mackerel. Beaumaridge states that the first major spawning event occurred at about 880 mm for females and 770 mm (SL) for males. Finucane et al. 1986 established that females were 100% mature in the length interval of 700-749 mm (FL). Fitzhugh et al. (SEDAR 16-DW-6, 2008) observed first maturity at 602 mm, while most ripe females were larger than 700 mm (FL).

This information correlates with the measurements obtained this past July, where the majority of males were 65 to 85 cm (FL) and most females ranged from 70 to 90 cm.

Figure 7 illustrates the stock assessment and management results since implementation of the stock assessment process. This should be an integral part of each assessment. Paul A. Medley, a CIE reviewer from the UK, and a panel member in the SEDAR 16 RW, made a clear and concise statement concerning this subject. In his SEDAR 16 Consultant Report, he states, "It is important to review past management actions and their effect on the stock. This forms part of the management cycle, giving feedback on the effectiveness of the control and whether relevant management objectives are being met." These results were not included in either the king or Spanish mackerel assessments.

The blue line in Figure 7 represents the best management advice (ABC midpoint) from the Mackerel Stock Assessment Panel (MSAP). You can understand why I had serious concerns when the current Magnuson Act reauthorization removed the Council from the quota setting process and placed that responsibility squarely on the shoulders of the stock assessment analysts and the Council's SSC.

The management guidance indicated by the blue line in Figure 7 is substantially higher than the total landings. The management advice intersects total landings in only 3 of the 22 years of management guidance. The early assessment recommendations suffered from two main causes. First was an over estimation of the stock's productivity at that time. And, second, the assessments were chasing a declining fishery from the start due to the introduction of the drift gillnet combined with traditional harvest methods.

The TAC chosen by the Council, in consultation with their Advisory Panel, is also higher than total landings but lower than the management guidance in most years (Figure 6). It should be emphasized that both commercial hook and line and recreational interests were voicing their concerns that the stock assessment results and their corresponding TACs were higher than the stock could sustain in the early assessment period.

The second question concerned the trends observed in my catch history and how well they related to total or commercial landings. Commercial landings (Figure 9) portray similar declines discerned in my catch history (Figures 3-4). Total landings (Figure 7) depict significant differences from my catch history and the commercial landings. Total landings indicate a similar decline from 1987 through 1991 (Figure 7). Total landings increased substantially in 1992 (Figure 7), in contrast to my catch history, which indicates the lowest catch of the time series (Figure 5). The commercial landings stream continues to decline in 1992-93 (Figure9), while total landings show an important increase. This difference is driven by the recreational landings, which by way of their collection methodology do not exhibit the accuracy of commercial data. Increases in the 1992-93 recreational data (Figure 7) were probably not real given the direction of my catch history (Figures 3-4) and the commercial landings (Figure 9).

Another important discrepancy exists between the different landings streams in 2003-07. Total catch shows a flat pattern until 2007 (Figure 7), while both my catch history (Figure 3) and the commercial landings (Figure 9) depict significant increasing trends. The point of this discussion was to illustrate the effect of recreational landings have on total harvest. Essentially, the recreational catch stream masks the trends observed in commercial data, which is an important factor when illustrating trends in fishery dependent data.

The third question focuses on what impact would SEDAR 5 have had if the ABCs of that assessment had been implemented by the Council.

SEDAR 5 ushered in the next generation of stock assessment scientists ready to weigh in on Atlantic kings. They brought their fresh bag of mathematical wizardry to the assessment process. Their first attempt at assessing Atlantic king mackerel was polar opposite to the problems experienced by the previous assessment team. To their credit, they tried to address the productivity issue. Unfortunately it happened to coincide with the most substantial rebuilding in stock assessment history (Figures 9 and 10)! In 1999, the assessment estimated MSY at 10.4 million pounds. Results of the 2003 assessment indicated a much lower MSY of 5.9 million pounds. The recommended ABC at Foy was even lower at 5.2 million pounds. The impact of a 5.2 million pound quota on the commercial sector is illustrated in Figure 10. The commercial allocation from the quota would have been 1.924 million pounds. The reduction in commercial harvest corresponding to the three seasons (2004/05-2006/07) would have been 996,000, 500,000 and 1,856,000 pounds, respectively. Total losses to the commercial fishery for the three seasons, using a $2.00 per pound average price are estimated at $6,602,000. Additional losses would have been incurred by the recreational fishery. The recreational fishery would have exceeded its allocation in each of the three seasons.

It may be helpful to review what assessment inputs were responsible for the substantial decline in stock productivity in SEDAR 5. “First, it appears for Atlantic king mackerel that cohorts must be present for several years before their abundance can be well estimated. Therefore, several cohorts were estimated to be much larger in the 1998 assessment than retrospective estimates for the same cohorts in the 2003 assessment. A second reason for the difference in the estimated MSY is the selectivity-at-age vector in markedly different between the two assessments, with ages 4^{+}estimated to be more or less fully selected for the most recent years in the current assessment. The effect of these two factors is that

certain year classes were estimated to be smaller in the current assessment than in 1998 and the change in estimated selectivities results in lower yield per recruit; therefore, estimated MSY decreased from the 1998 assessment to the 2003 assessment."

After the conclusion of SEDAR 5, a minority report, which I coauthored, was deliberated by the SSC in conjunction with the stock assessment. The SSC determined that continuing the policy of contributing 100% of landings in the mixing zone to the Gulf stock was not the best scientific information available and the stock assessment was rejected. That left the king mackerel stock assessment in a status quo (10 million pound TAC) mode, which is the current management position.

The Atlantic king mackerel fishery has been operating under the same 10 million pound TAC for ten consecutive seasons. Previously the stock was assessed every year or in alternate years. It is worthwhile exploring the changes in the stock during the past 10 seasons. The sizeable year (size) class that was evident in the 1996-97 commercial catches moved through the fishery in declining numbers until 2004 when another large size (year) class entered the fishery (Figure 9). In 2006, the largest size class to enter the fishery in 20 years was observed between Cape Canaveral and Jupiter, Florida. This size class should comfortably support catches over the next 7 to 8 seasons.

Average commercial catches 1981-85 were 2.63 million pounds. The average commercial catches 2003-07 were 2.50 million pounds. Ladies and gentlemen, we have successfully rebuilt Atlantic king mackerel to historic catch levels in 22 seasons! King mackerel live to about 24 years of age and you would expect to rebuild a mackerel species in about one lifetime and we did it with two years to spare!

How did we get here without the substantial quota reductions normally associated with rebuilding a stock? It was accomplished under the way in which I feel the original authors of the Magnuson/Stevens Act envisioned. Recreational and commercial hook and line fishermen banded together and convinced the SAFMC and the NMFS (begrudgingly) to prohibit the drift gillnet gear, which was threatening the sustainability of the stock. Additionally, restrictive trip limits of 50 fish off South Florida and 3,500 pounds north of the Flagler/Volusia County line were proposed by industry and implemented by the Council. Recreational fishermen offered bag limit reductions, which were implemented by the Council. In the face of uncertain scientific guidance, the Council process succeeded in rebuilding the stock.

It is my belief that harvest totals from the late 1970's to about 1986 were sustainable. As I watched this stock in spring and summer every year the amount of king mackerel available never seemed to diminish. The commercial fleet was considerably larger than today and everyone caught fish. To get some idea of a sustainable total catch I calculated average catch for 1981-1985. The values were average (1981-85) = 8.44 million pounds or average = 8.74 million pounds (1981-85, discarding high and low values). In my view this harvest level was sustainable in the past and that current stock trajectories under current stock management are moving quickly toward these values. It is important to recognize that these harvest levels are for Atlantic stock only. They do not reflect the 50/50 Atlantic/Gulf mixing zone values used for calculating catch levels in the current assessment.

I mentioned the productivity issue from SEDAR 5 earlier to add my own insight into a number of factors which potentially increase Atlantic king mackerel productivity. The prohibition of all gillnets in the

Atlantic king mackerel fishery in Federal waters combined with the gillnet prohibition in the mixing zone off Southeast Florida are significant factors affecting productivity. The way in which the run around gillnet operated where essentially the bottom of the net was pulled in the same way a purse seine operated made this gear very effective. Gillnetting of this magnitude was accompanied by a large loss of resources, which no longer occurs. The Florida gillnet prohibition in 1995 also had an effect in increasing productivity due to the significant decline of the catches of juvenile king mackerel, which occurred in the Spanish mackerel fishery. The Florida gillnet prohibition also eliminated shrimp trawling within one nautical mile of the beach reducing the mortality of juveniles. And not the least of which shrimp trawl by catch has been substantially diminished with the decrease in shrimp trawl effort approaching 50% over the past 10 years. And as mentioned before, the implementation of restrictive bag and trip limits has impacted productivity. All of these elements were operating on the stock for long periods of time except quotas, bag and trip limits. Based on year class strength in the recent past, the stock is not near equilibrium. It will be interesting to observe stock trends in the near future as productivity may increase to levels not observed in my lifetime.

In the SEDAR 16 Assessment Summary, Table 1 represents estimates of landings for the king mackerel Atlantic stock, including the 50% split of catch in the mixing-winter area. I have not tried to advance any suggestions on what the quota might be using this table because the numbers that I have used do not relate to the numbers in the table. As an example, my Atlantic commercial total for 2006/07 is 3.78 million pounds for commercial, where the Table 1 total for commercial using the 50% split is 3.731 million pounds, lower than my Atlantic commercial total! Landings figures used in my paper were based on Table 4 in SEDAR 5 for the 1981/82 – 1985/86. The 1986/87 – 2006/07 numbers are from a Council document whose source was ALS data, August 9, 2006; data provided by the SEFSC, October 2006. Overall the numbers used in SEDAR 16 were not well referenced or explained and frankly confusing to me. I hope you have been able to fare better than I have in calculating a quota based on Table 1 of the stock assessment summary. And also why would you use this elaborate estimation procedure for calculating estimated directed landings? I guess there is not enough uncertainty in the assessment!

Thank you,

Ben C. Hartig

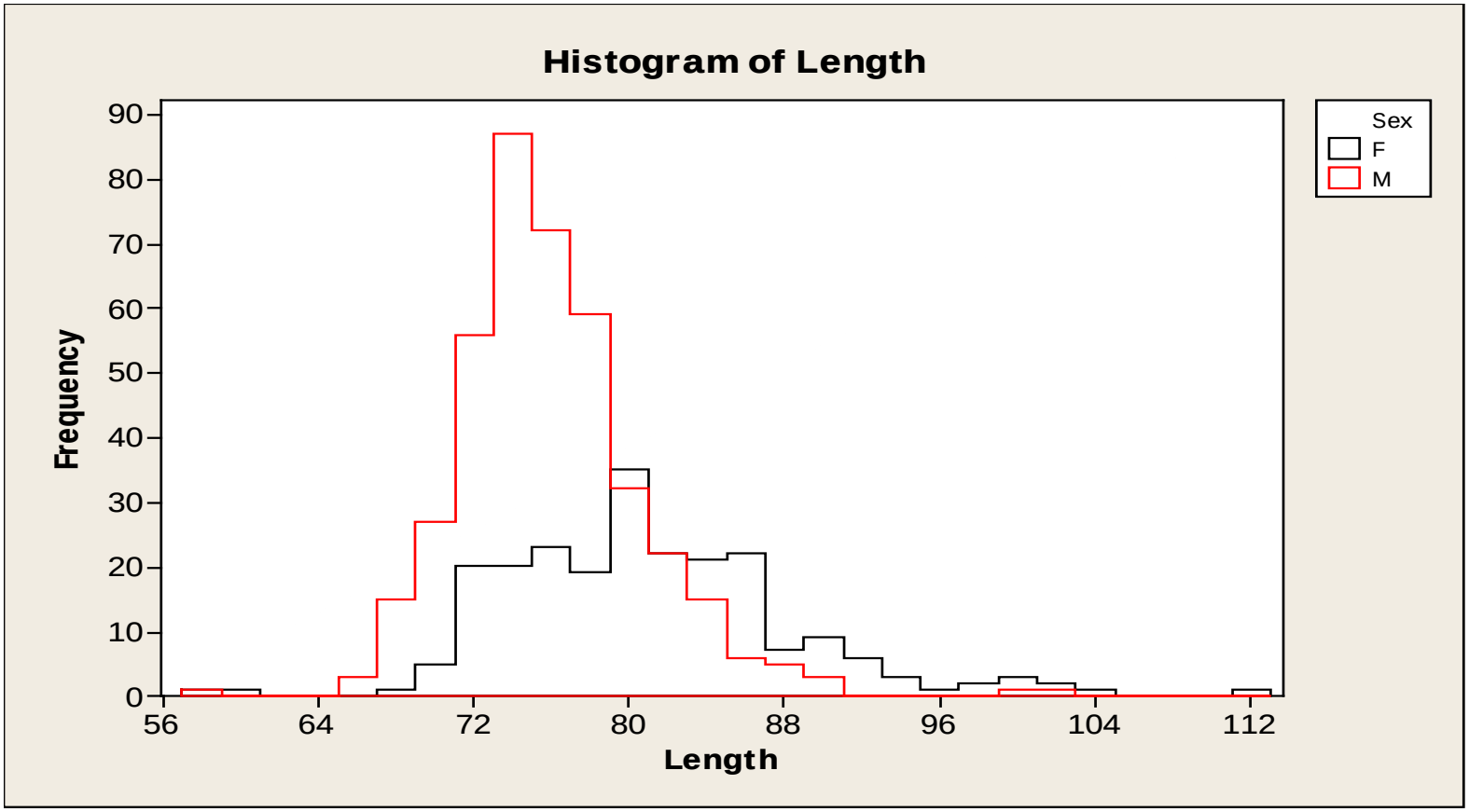


Figure 1. Histograms depicting measurements of king mackerel by sex collected in the vicinity of Jupiter Inlet, Florida from 9 July 2008 through 1 August 2008. Red line represents males (n=405). Black line represents females (n=225). Length measurements are in cm.

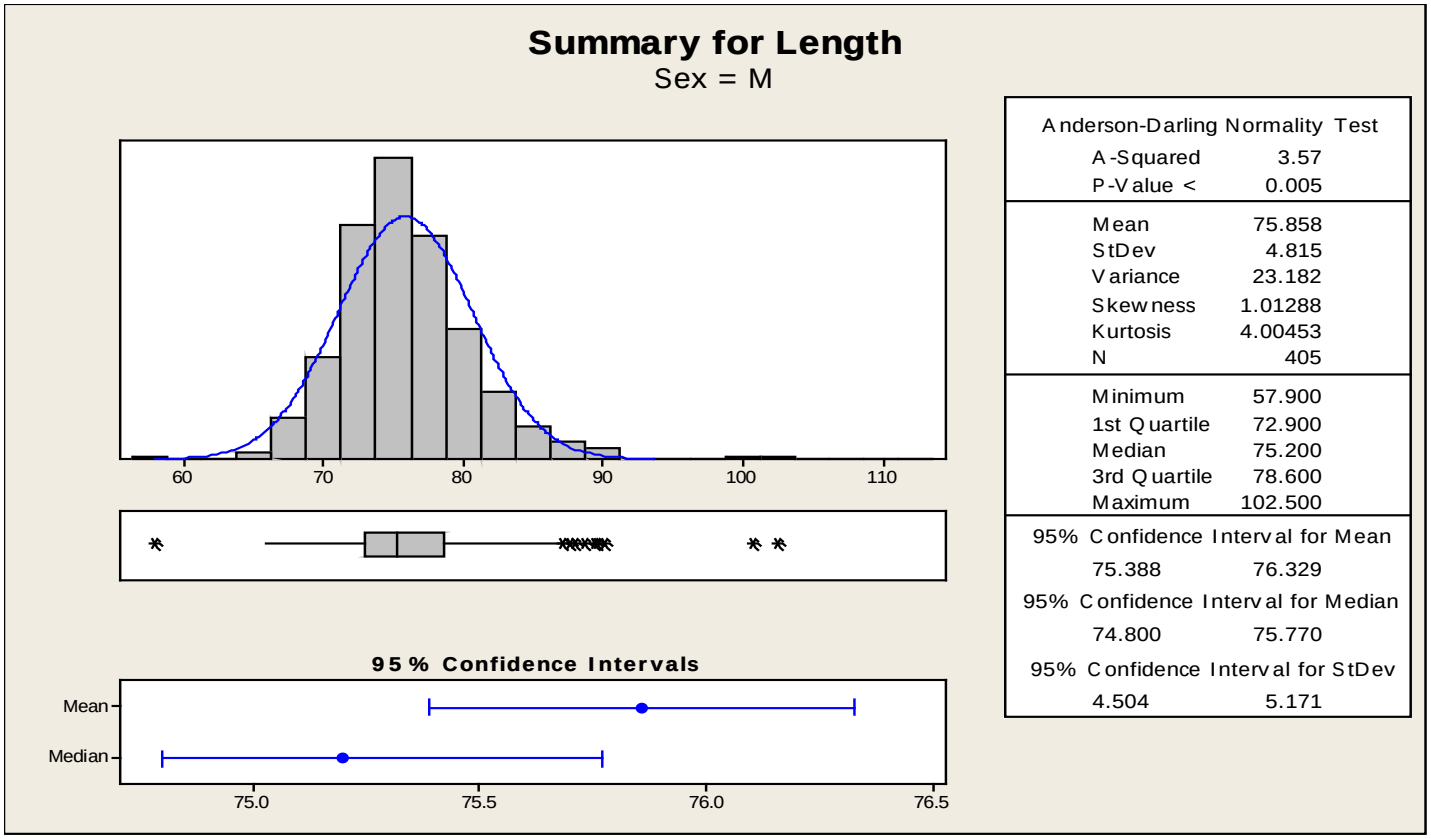


Figure 2. Size distribution and summary statistics for male king mackerel collected in the vicinity of Jupiter Inlet from 9 July 2008 through 1 August 2008 (n=405). Length measurements are in cm.

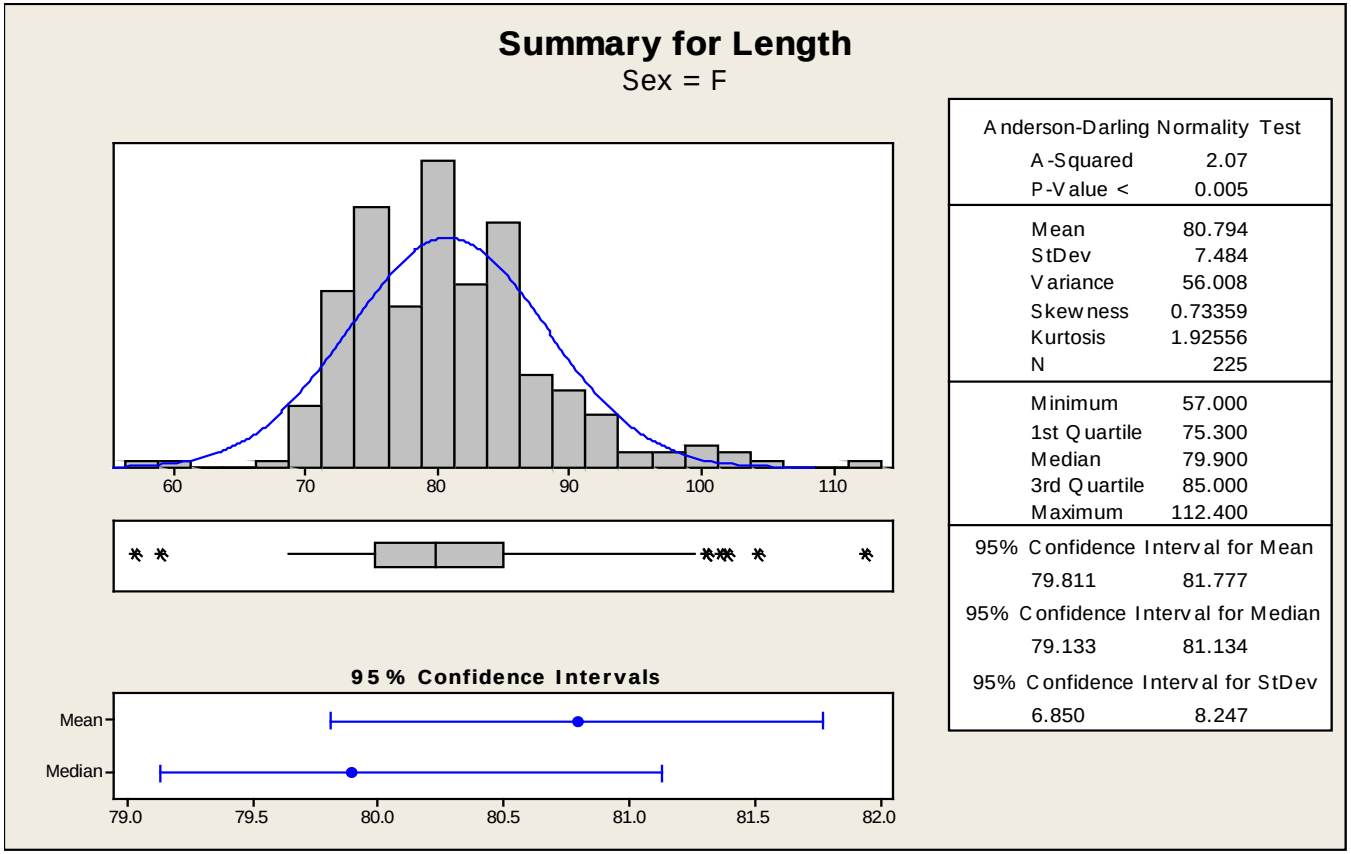


Figure 3. Size distribution and summary statistics for female king mackerel collected in the vicinity of Jupiter Inlet from 9 July 2008 through 1 August 2008 (n=225). Length measurements are in cm.

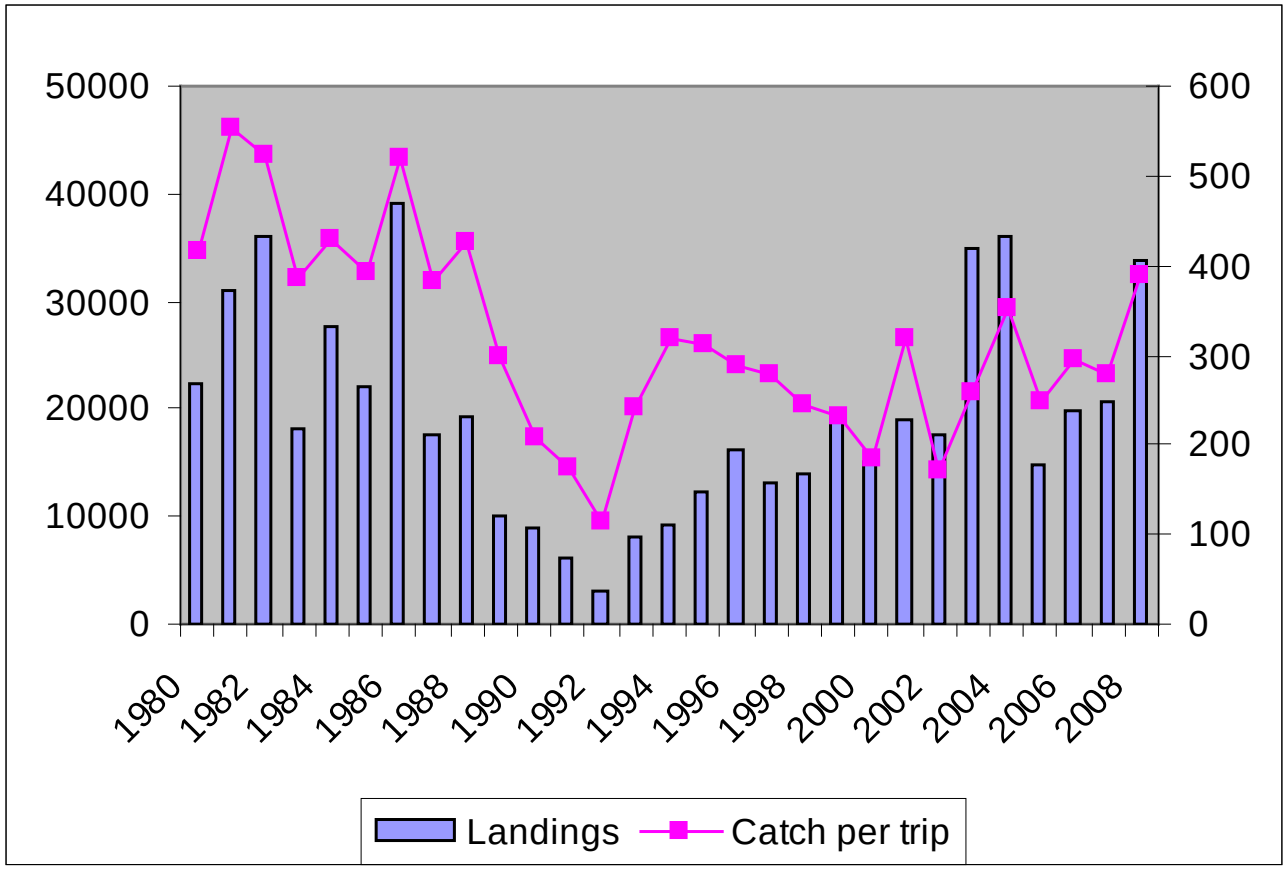


Figure 4. Personal landings data from Ben Hartig made in the vicinity of Jupiter Inlet, Florida during the months of April through September (1980 to 2008 missing 1997). Gray bars represent total pounds caught (April to September). Blue line represents catch per trip.

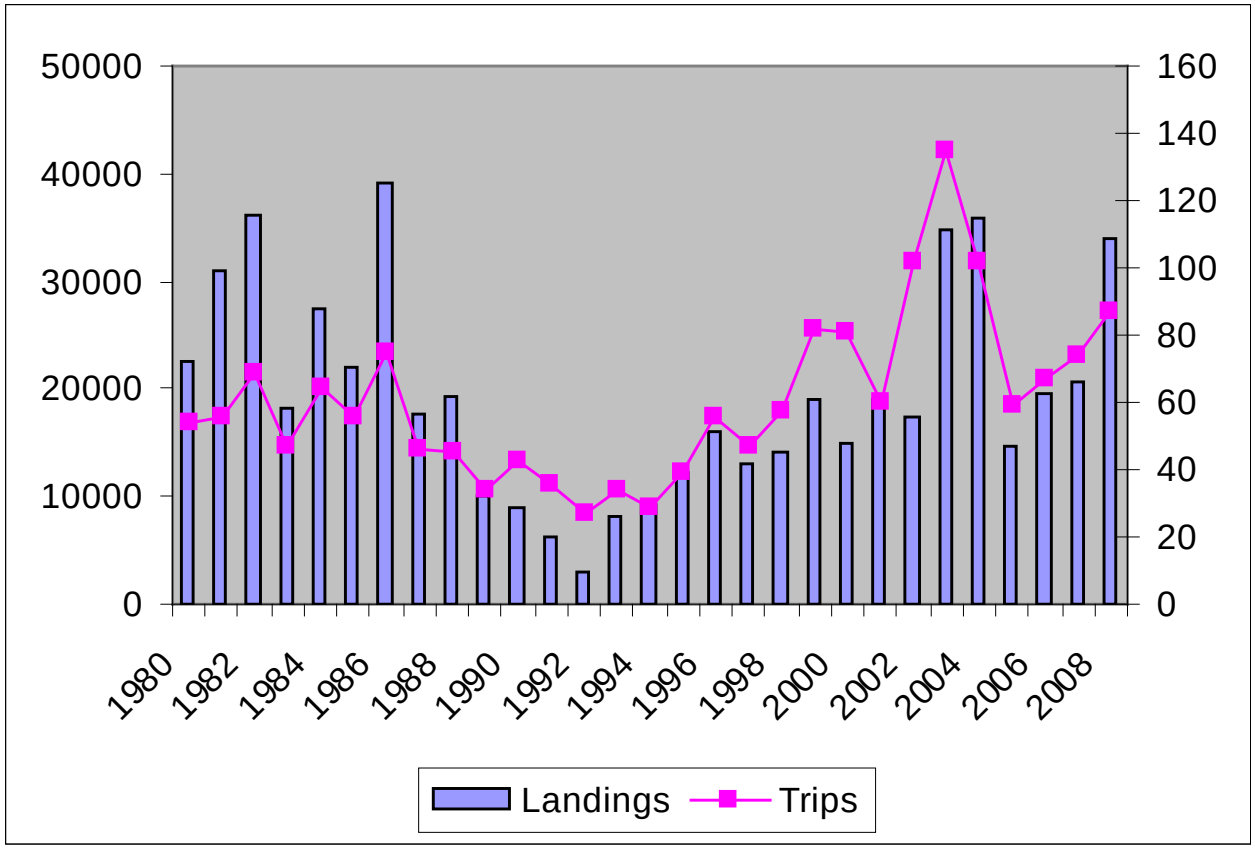
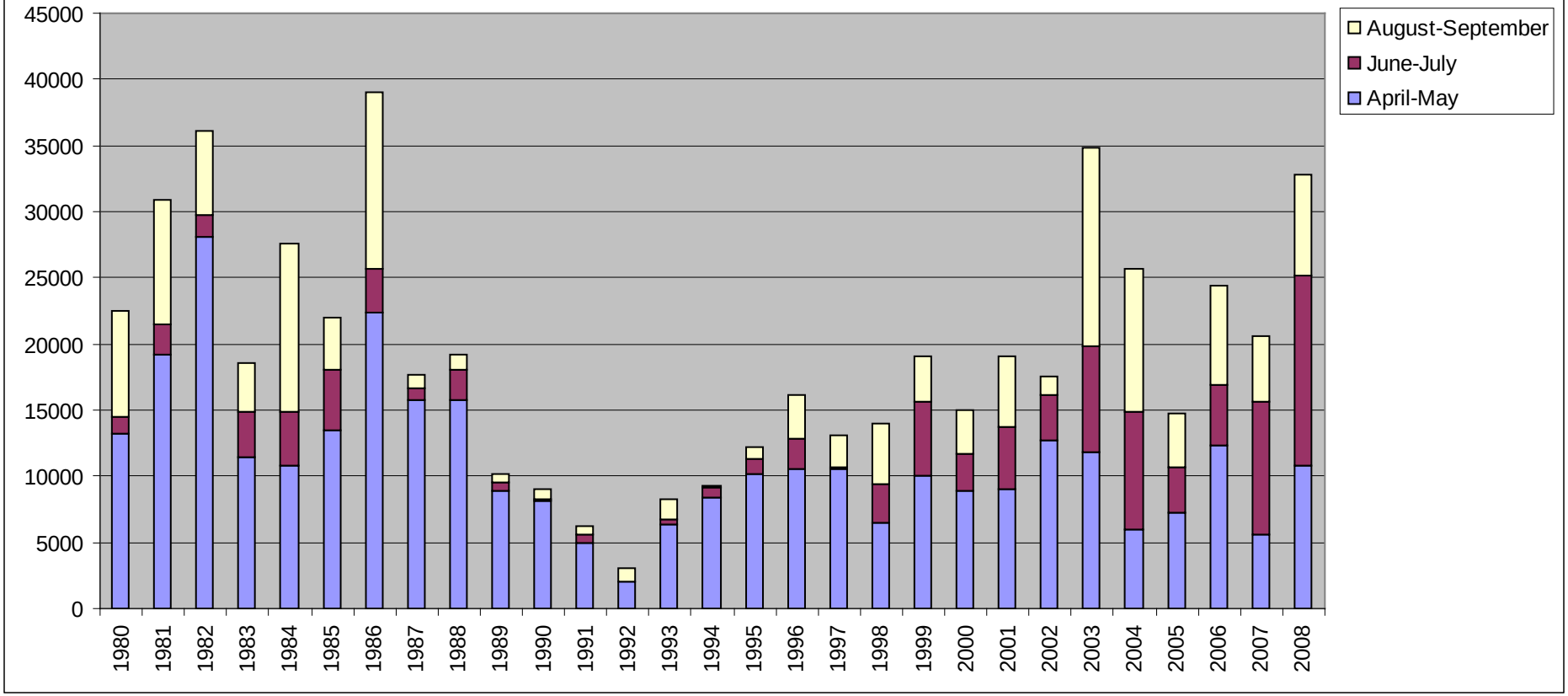


Figure 5. Ben Hartig's catch history from 1980 through 2008 during the April through September period. Gray bars represent total pounds landed (April through September). Blue line represents the number of trips for each year.

Figure 6. Bimonthly landings (April to September) from within 20 mile radius of Jupiter Inlet, Florida



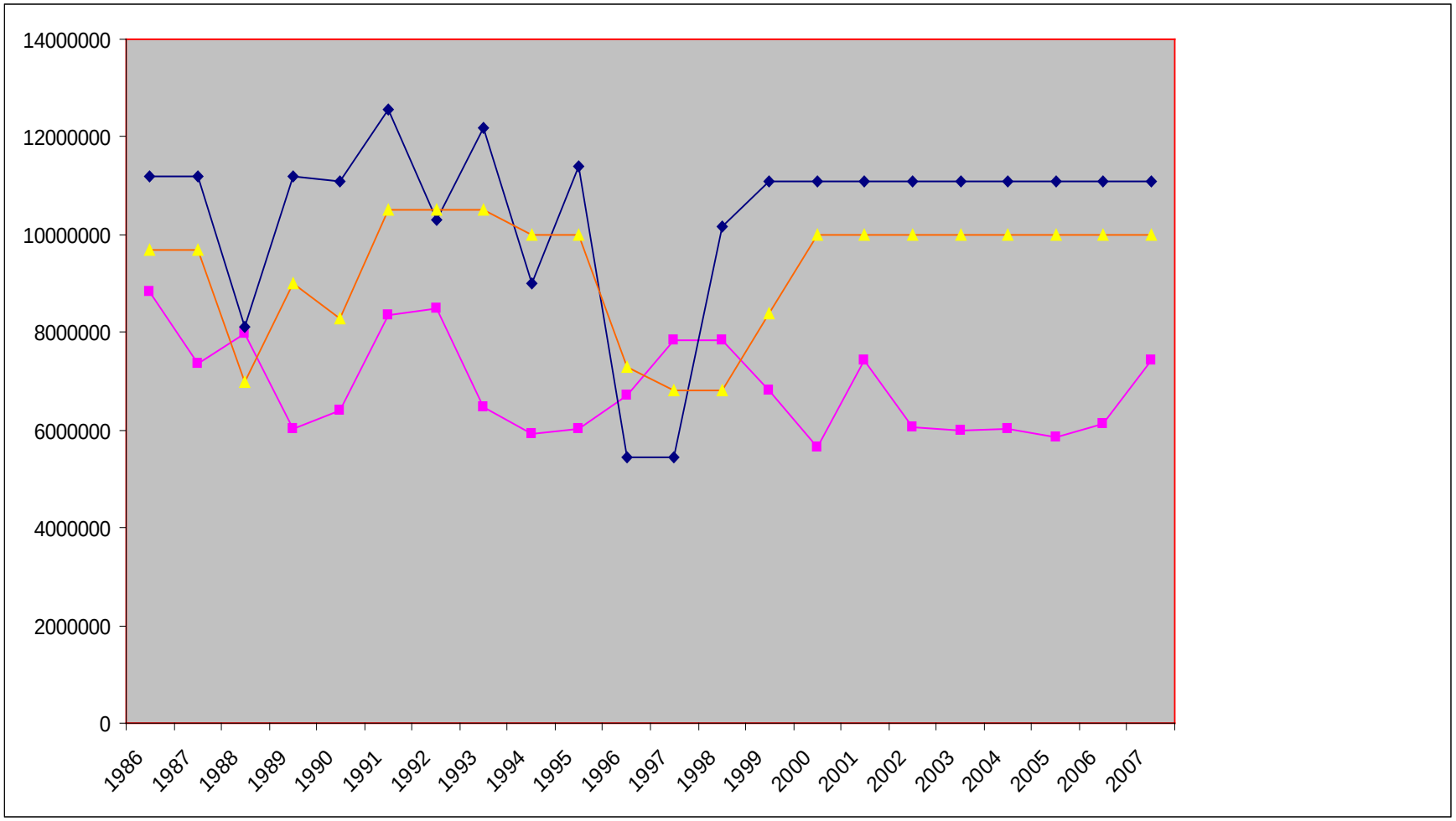


Figure 7. Total landings, Total Allowable Catch and the midpoints of the Allowable Biological Catch for the entire assessment period (1986-2007).Blue(midpoint, ABC),Orange(TAC),Pink(total landings)

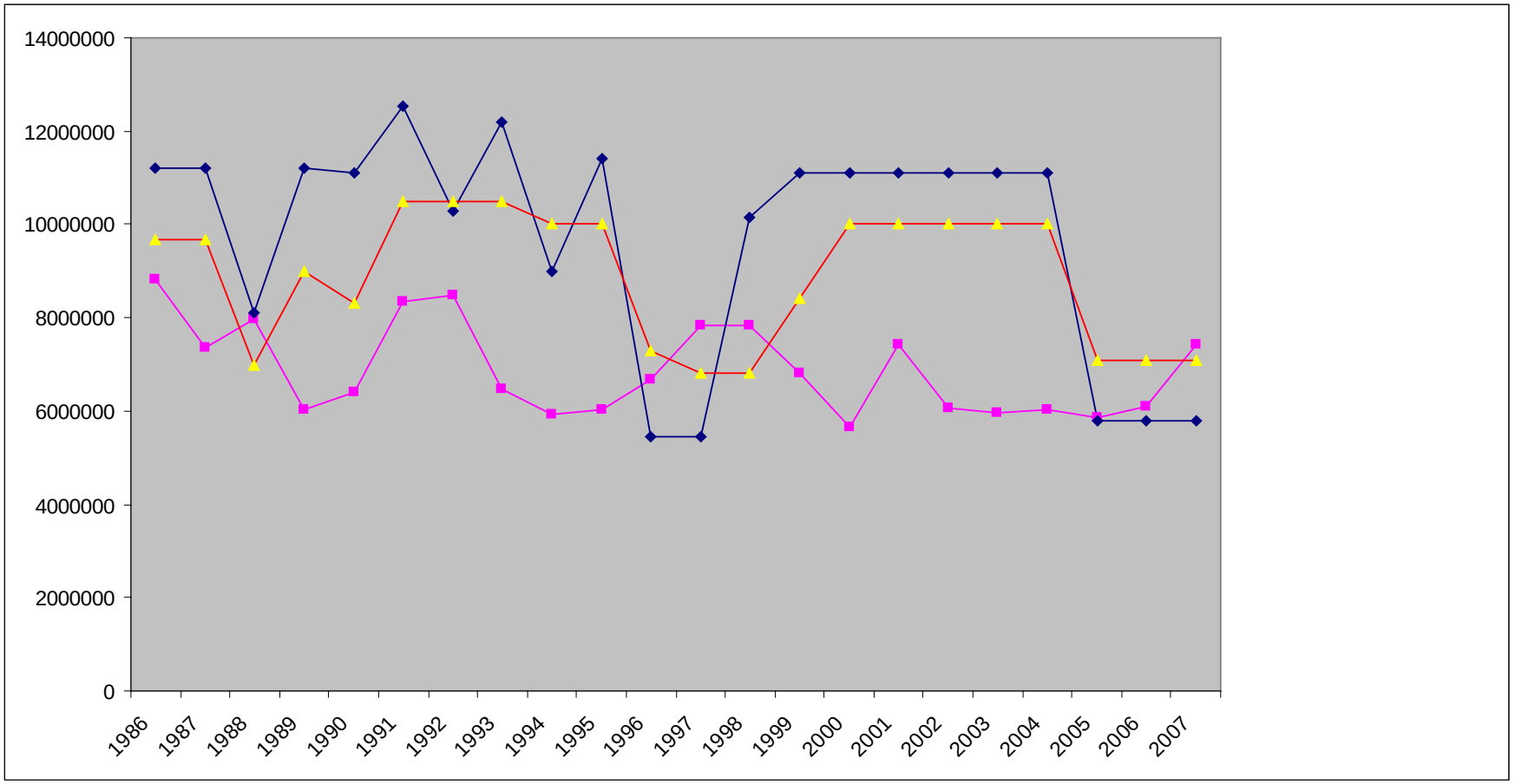


Figure 8. Total landings, TACs and midpoints of the ABCs for the assessment period (1986-2007). Changes in the 2004 through 2007 period include the midpoint from the 2004 king mackerel assessment and the SAFMC's preferred alternative for TAC. This TAC was based on the new 50/50 change in the mixing zone allocation scheme.

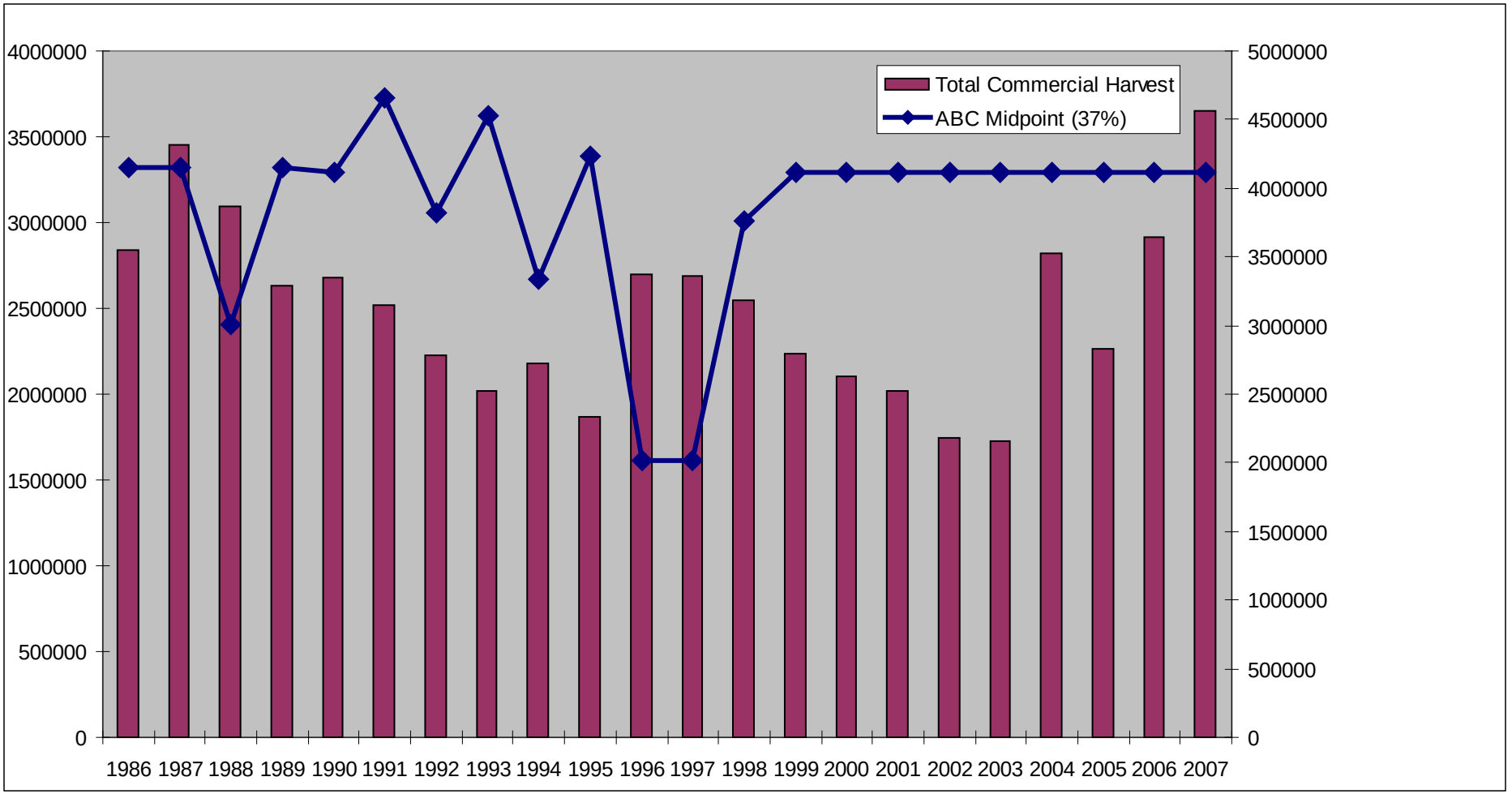


Figure 9. Commercial landings compared to the ABCs for each year (1986-2007). These ABCs represent the commercial allocation based upon the midpoint of the ABC range from the stock assessment.

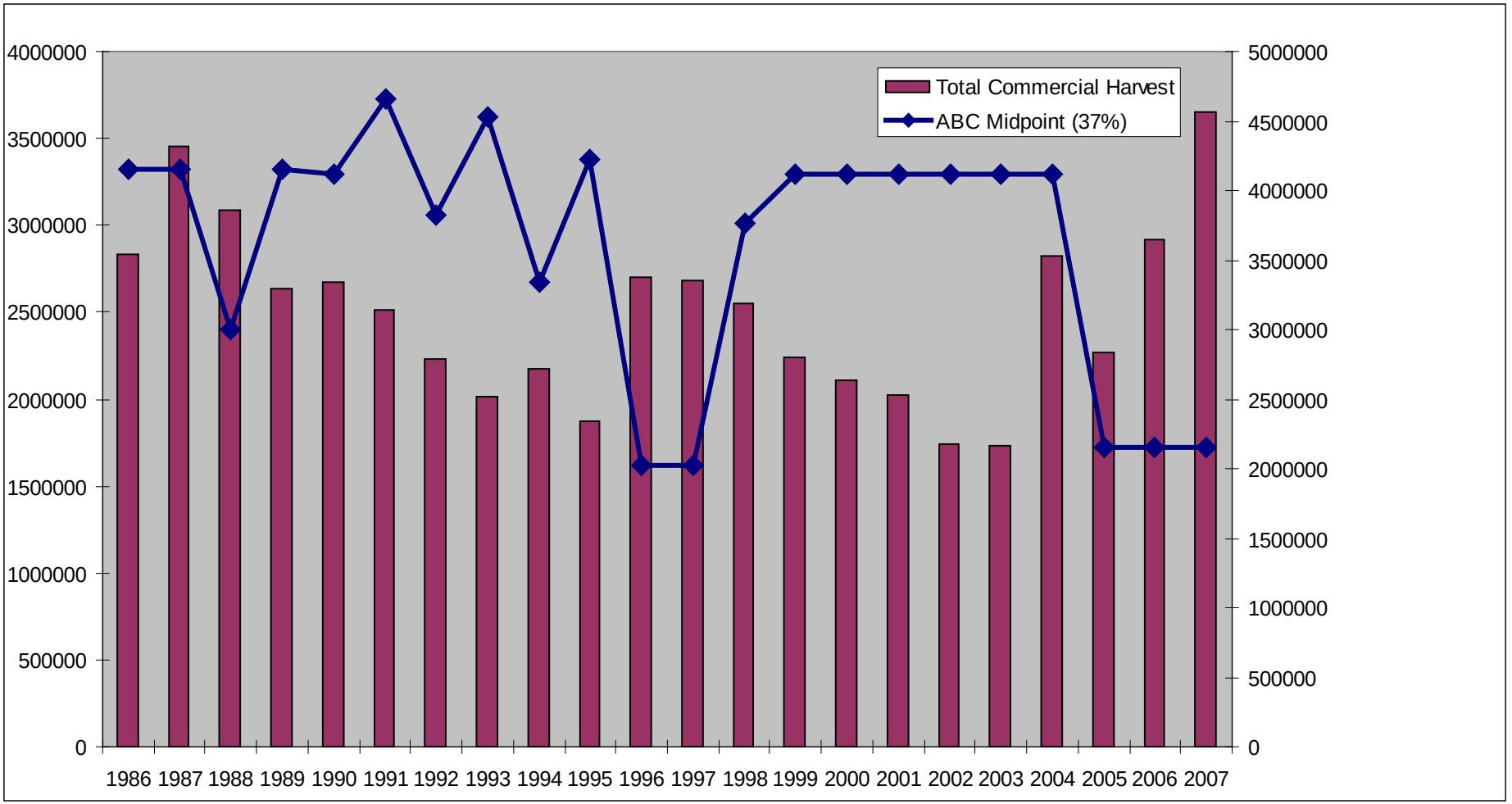


Figure 10. Commercial landings relative to the commercial ABCs for each year (1986-2007). Commercial ABC midpoints calculated at 37.1% of the midpoint of the ABC range from the assessments. The new 2005 midpoint reflects results from the 2004 assessment.

Figure 11. Length Frequency Sample Size for Atlantic King Mackerel caught by hook-and-line 1983 to 2006

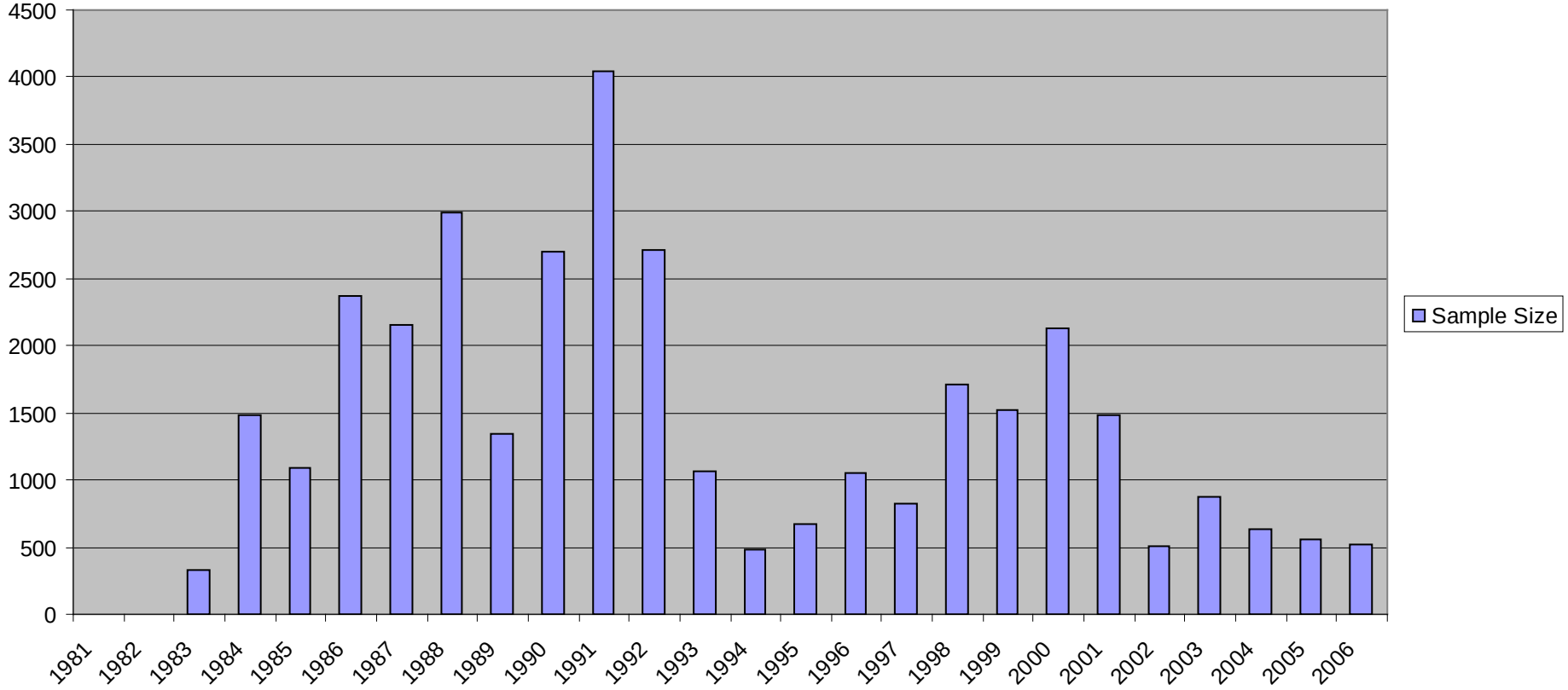


Figure 12. Length Frequency Sample Size for Mixing Zone King Mackerel caught by hook-and-line 1981 to 2006

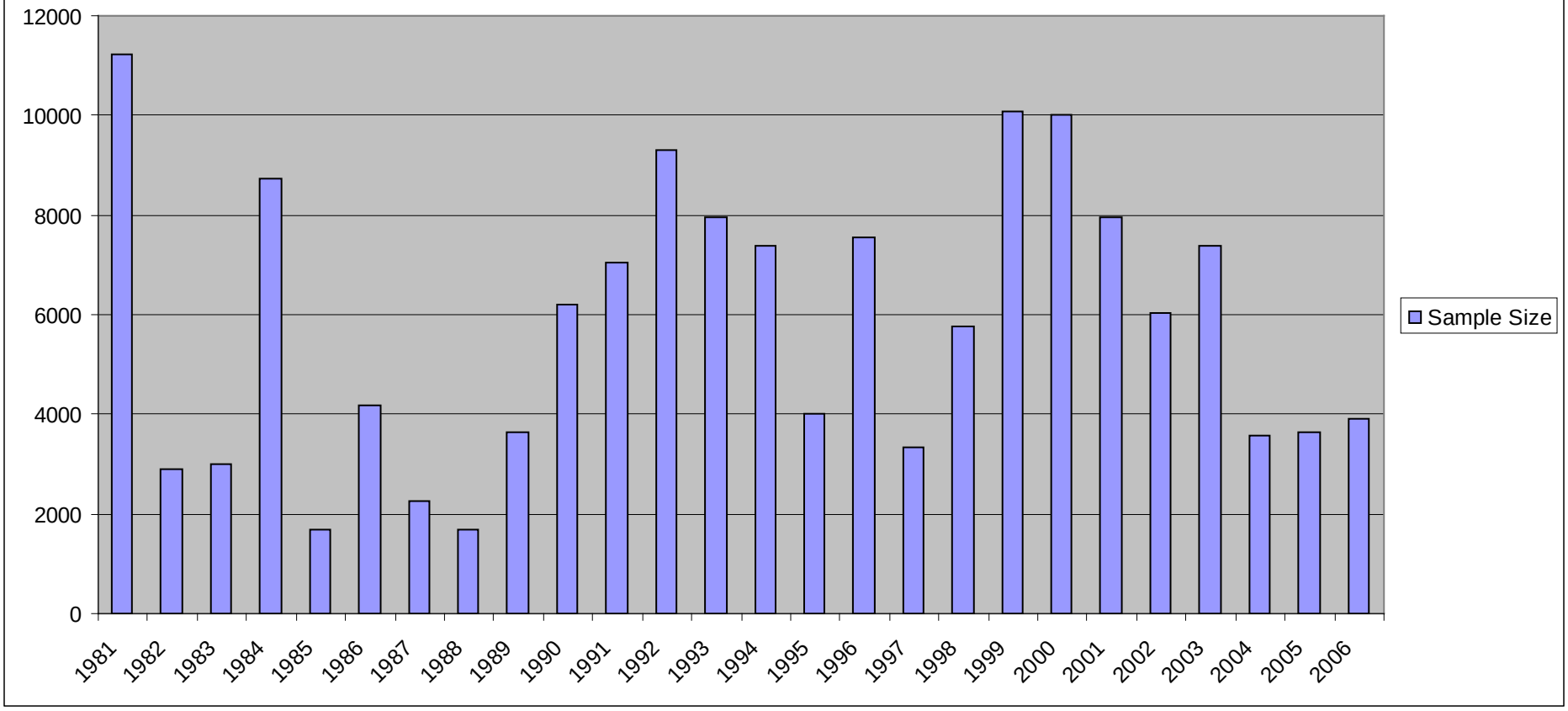


Figure 13. Annual numbers of King Mackerel from the Atlantic 1986 to 2006 aged by Panama City Laboratory
(Table 2. SEDAR 16-DW-07)